Xerox Docket No. D/A0A39Q

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Ruth E. ROSENHOLTZ et al.   Group Art Unit: 2178

Application No.:   09/682,229   Examiner: Kyle R. Stork

Filed: August 8, 2001   Docket No.:   108762

For: METHODS AND SYSTEMS FOR GENERATING ENHANCED THUMBNAILS

DECLARATION UNDER 37 C.F.R. §1.131

Commissioner for Patents
P.O. Box 1450
Alexandria, VA   22313-1450

Sir:

    We, Ruth Rosenholtz, Allison G. Woodruff and Andrew Faulring, hereby declare and state that:

    1.   This Declaration is submitted as evidence that the invention of this application was invented by us prior to June 15, 2001, which is the effective filing date of U.S. Patent Application Publication No. 2003/0006995 to Smith et al., entitled "Orthogonal Magnifier Within a Computer System Display," which was applied in the February 16, 2005 Office Action.

    2.   We are the named inventors in the above-identified application.

    3.   We are the inventors of the invention described in an invention proposal entitled "Enhanced Thumbnails of Documents," which appears as Exhibit A attached to this Declaration. The invention proposal is signed by us and dated October 3, 2000.

    4.   The copies of these pages which constitute Exhibit A are true copies of the invention proposal.

5. The invention described by Exhibit A was conceived and actually reduced to practice by us in the United States at least as early as October 3, 2000.

6. We were in possession of the invention recited in claims 1-3, 6-22, 25-28 and 30-40 as evidenced by the entire disclosure of Exhibit A.

7. We hereby declare and state that all statements made herein of our own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine and/or imprisonment under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing therefrom.
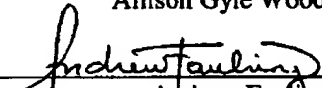

Date: _____   _____
                                        Ruth Rosenholtz
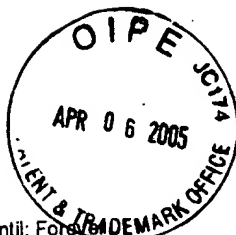
Date: _____   _____
                                        Allison Gyle Woodruff

Date: 30 March 2005   _____
                                        Andrew Faulring

Attachment:
        Exhibit A

- 2 -

EXHIBIT A

D|A0A39

Invention Proposal

THE DOCUMENT COMPANY
XEROX

IP A 0 1 5 6 0

Protect Until: Forever/Until

Signed hard copy To: Xerox Intellectual Property Law Department

☐ Xerox Square -20A, Rochester, NY 14644, MailStop XRX2-20A - Send electronic version to your mgr. & copy to: USA.IPLD.MC@mc.usa.xerox.com

☐ El Segundo,CA, 1990 Xerox Centre Dr. 90245, MailStop ESC1-405 -Send electronic version to your mgr. & copy to:
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☒ Palo Alto, CA, 3333 Coyote Hill Road 94304, MailStop: PARC - Send electronic version to your mgr. & copy to: USA.IPLD.PA@mc.usa.xerox.com

☐ Wilsonville,OR, 26600 SW Parkway 97070, MailStop: 7063-LAW   Send electronic version to your mgr. & copy to: USA.IPLD.OR@mc.usa.xerox.com

	Proposal Submitted By (Please use legal name) Full First Name, Middle, Last		Employee No.	Outside Phone No.
1	**Ruth Rosenholtz**		989669	(650) 812-4390
	Organization (Unit/Div./Dept./Section)	Electronic Mail Address	Bldg. No./ Mail Stop	Fax No.
	XR&T/PARC/SPL/DiVA	**rruth@parc.xerox.com**	35/1650	(650) 812-4334
	Proposal Submitted By (Please use legal name) Full First Name, Middle, Last		Employee No.	Outside Phone No.
2	**Allison Gyle Woodruff**		994117	(650) 812-4429
	Organization (Unit/Div./Dept./Section)	Electronic Mail Address	Bldg. No./ Mail Stop	Fax No.
	XR&T/PARC/ISTL/UIR	**woodruff@parc.xerox.com**	35/2330	(650) 812-4258
	Proposal Submitted By (Please use legal name) Full First Name, Middle, Last		Employee No.	Outside Phone No.
•3	**Andrew Faulring**			(__) - __-___
	Organization (Unit/Div./Dept./Section)	Electronic Mail Address	Bldg. No./ Mail Stop	Fax No.
	CMU (PARC summer intern)	**faulring+@cs.cmu.edu**		

* If space for additional submitters is required, please use another sheet; and attach any supplementary Comments.

Manager	Electronic Mail Address	Bldg. No./MS
David Fleet	fleet@parc.xerox.com	35/1642

Technical Category (see attached list)	Name of Xerox Program (if any)
Suggested categories: 1.2, 2.4, 6.2	

Opportunity for licensing revenue Who could be interested in it?   How is this better than alternatives?
Many search engine vendors could be interested in using this technology, among others. Our study shows that people are significantly more efficient searching web pages when using our enhanced thumbnails versus traditional text summaries or enhanced thumbnails.

Descriptive title of invention
Enhanced thumbnails of documents

Describe the problem   How was this problem tackled before your invention?
The challenge is to create thumbnails that are information-rich yet retain the ability to be scanned quickly. Previous thumbnails fall into two categories: (1) simple scale-reduced images of documents [e.g., 1, 2, 3] (occasionally augmented with metadata about the document [4]) and (2) images composed of selected elements or visual representations of metadata properties from the document [5]. The former contain little information, e.g., often none of the text in the thumbnail can be read. The latter images bear little visual resemblance to the original document, so properties like genre that can be scanned quickly are lost. It remains to be seen how quickly people can scan abstract representations of metadata.

Summary of the invention   Describe briefly what the invention is and how it works in 5 –8 lines.
We introduce a technique for creating novel, enhanced thumbnails of documents. These thumbnails combine the advantages of image thumbnails and of other types of summaries (e.g. text), i.e., they can be scanned quickly but contain more information than traditional thumbnails. Our thumbnails include a reduced image of the document along with various forms of emphasis of information in the document: (1) modifying the document format (e.g., HTML) prior to scale reduction or (2) overlaying graphical elements (e.g., text callouts) on the scale-reduced thumbnail.

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	12/8/00
Submitter(s) Signature(s)	Date
	9/29/2000

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Page 1

Invention Proposal (Office 97)

Describe your invention Describe how to make and use the invention and it's novel embodiments. Cover the process, method, materials with sketches, flow charts, usage etc. What are the advantages of your invention for Xerox?

In this IP we describe our enhanced thumbnails, focusing on a particular instantiation of those thumbnails that we have tested and found to be more effective for a web search task than either text summaries or simple reduced-image thumbnails. We also describe, in brief, the system for generating these thumbnails, and in the process try to give a feeling for the breadth of what we mean by "enhanced thumbnails." For more details, we include our recent CHI submission, "Using Thumbnails to Search the Web."

Our enhanced thumbnails could be useful in virtually any system in which thumbnails might be useful. Some suggested applications are browsing or searching the web, management of email or an on-line document corpus, and so on. Though we have so far implemented a system that generates a thumbnail from an HTML document, one could generate enhanced thumbnails from virtually any text/mixed-media file format, and possibly even from an image format (e.g. a scanned document) plus OCR.

Generating enhanced thumbnails is a multi-step process involving multiple renderings. The steps include the following, or some subset thereof:
1. Specify important elements of the document.
2. Modify the original document format.
3. Render a reduced image of the modified document.
4. Extract properties of the reduced image.
5. Re-render the thumbnails with one or more overlays, possibly making use of the extracted properties.

Below we discuss these steps in somewhat more detail, giving examples of the resulting thumbnails. We believe thumbnails generated using such a
series of steps to be novel, as they both allow a great deal of preservation of the original document format – which provides information about such things as document genre – and the presentation of additional information in the form of overlays on the basic thumbnails. Previous thumbnails have either been simple reduced images of a page of the document, possibly including abstract representations of document metadata, or abstract collections of elements or metadata from the document, represented in a way that loses all of the original appearance of the document.

Specify important elements of the document:
There are a number of ways that the important elements might be specified. The user might specify them, in some applications. In our implementation, which is a web search application, we took search terms and h1 and h2 headers to indicate important text. One might also imagine using text words with high TF*IDF scores, terms resulting from information scent computations [6], the document title or URL, and so on. Items other than text might be labelled as important: images labelled as "representative" [5], tables, etc.
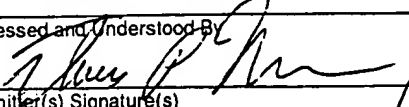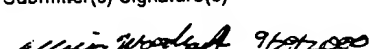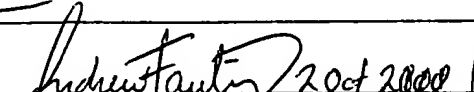
In general, items could be specified as important elements by the output of any model of importance in a document: models of user intent, models of human perception, eye-tracking data, etc.

Modify the format of the original document:
Here we change the formatting of the original document, along any dimension in which one typically has control of the formatting. In our implementation we increase the size of h1 headers so as to make them "readable" in the reduced thumbnail image (we specify the size required for readability by hand, but this might also be done automatically in various ways). We also highlight important words specified by the previous step.

Render a reduced-size version of the modified document:
In our implementation, we render a simple reduced image of either the first page of the document, a page of the document starting at an arbitrary point in the document, or the full document. Among other variants one might imagine

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	10/3/00

rendering with an arbitrary affine transformation or distortion of the document [8]. This step could make use of prior art on better filtering and subsampling techniques for generating reduced document images [e.g. 9].

Extract properties of the reduced image:

In our implementation, this includes extracting statistics of the colors in the reduced image, and the location and size of selected elements within the reduced image.

Re-render the thumbnails with one or more overlays:

In our implementation, we first overlay a translucent "fill" color over the entire thumbnail. This desaturates the thumbnail colors. This decreases the distraction from attention-grabbing elements in the original document, allowing our overlays to better draw attention, yet still allowing the basic structure of the original document to show through. We also overlay enlarged words from step 1, centered on the location of the same text in the underlying thumbnail. In our implementation, this text is highlighted by one of several translucent colors, each word consistently highlighted with the same color. We selected the highlight colors in a principled way, based upon a model of human vision, but they might also be selected by hand or in another way. Our implementation allows these highlighted words to (optionally) extend over the edge of the thumbnail. Furthermore, in our implementation these overlaid words maintain their original format except where specified, so that, e.g., HTML links still look like links (blue, underlined).
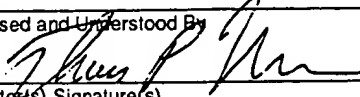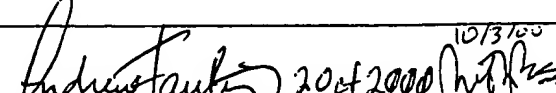
Figure 1 shows a number of examples of thumbnails we have generated that satisfy this constructive definition of enhanced thumbnails. As described in the paper, we have tested one variant of enhanced thumbnails in a web search task, comparing with performance using standard text summaries or plain reduced-image thumbnails. We found that users were significantly faster at finding the answer to their query using the enhanced thumbnails. Because of this result and our own experiences using the thumbnails, we believe that at the very least this invention may provide a licensing opportunity for Xerox to some web search company.

One area we have not yet explored is the use of animation in the thumbnails. For example, the thumbnails might animate to emphasize different pieces of information at different times, e.g., on mouse-over.

In addition to the novelty of the enhanced thumbnails, we believe there may be novelty in a couple of navigation system improvements suggested by the enhanced thumbnails. We have implemented neither of these system enhancements.

We call the first "click-through." Normally, when a user clicks with a mouse on a thumbnail, we'd like them to go to the document represented by the thumbnail. With click-through, the user would click in a particular way on a particular part of the thumbnail, and would either be brought to the corresponding part of the document, or would be brought to a document linked to by the corresponding link in the original document. Which of the two actions occurred might depend both on where the user clicked (is there a link in that location?) and how they clicked (middle button vs. right, keypress or no, etc.). This system enhancement is enabled by the enhanced thumbnails, since they may enhance text that will guide the user to a particular location in the document, and also may enhance links so that they are visible, obviously links, and large enough to click on easily.

The second system enhancement suggested by our thumbnails is also to enhance the document, at least temporarily. In this addition to the system, a user might click on an enhanced thumbnail and be taken to a document enhanced in the same way. This consistency between thumbnail and destination document should help the user find the document elements that drew their interest in the thumbnail. The enhanced document might, after a short time, morph to the original document.

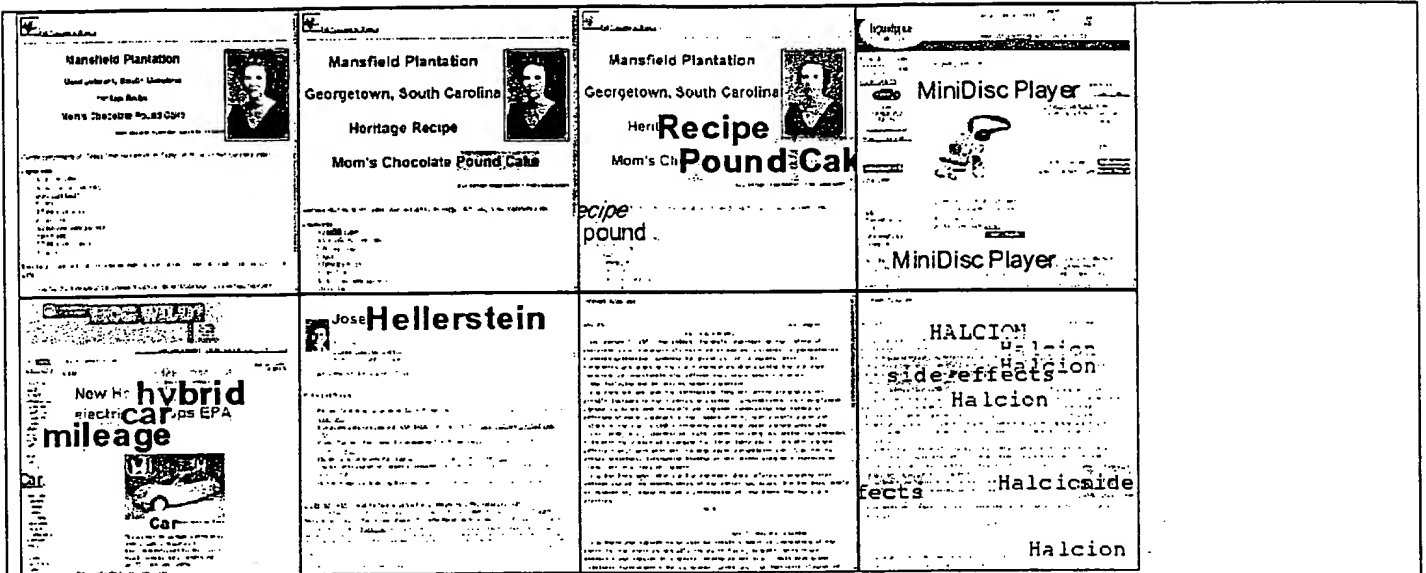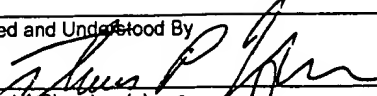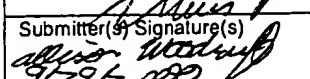| Witnessed and Understood By	Date 10/3/00
Submitter(s) Signature(s)	Date

Figure 1. Top row (from left to right): Plain thumbnail. Thumbnail enhanced with HTML modification. Thumbnail enhanced with HTML and image modification. E-commerce genre example. Bottom row (from left to right): News genre example. Homepage genre example. Plain thumbnail of text page. Enhanced thumbnail of text page.

People List names of others known to have worked on this or a similar invention

Examples of plain thumbnails:
[1] Ayers, E. and Stasko, J. Using Graphic History in Browsing the World Wide Web. In *Proc. 4th Intl. WWW Conf.*, Boston, December 1995.

[2] Hightower, R., Ring, L., Helfman, J., Bederson, B., and Hollan, J. Graphical Multiscale Web Histories: A Study of PadPrints. In *Proc. Hypertext'98*, 1998, 58-65.

[3] Kopetzky, T. and Mühlhäuser, M. Visual Preview for Link Traversal on the WWW. In *Proc. 8th Intl. WWW Conference*, Toronto, Canada, May 1999, 447–454.

Plain thumbnails plus metadata:
[4] Cockburn, A., et al. WebView: A Graphical Aid for Revisiting Web Pages. In *Proc. OZCHI'99 Australian Conf. on HCI*, Wagga Wagga, Australia, Nov. 1999.

Thumbnail "caricatures" – selected elements plus metadata, not attempting to mimic the appearance of the document:
[5] Wynblatt, M. and Benson, D. Web Page Caricatures: Multimedia Summaries for WWW Documents. In *Proc. IEEE Intl. Conf. on Multimedia Computing and Systems*, Austin, TX, June, 1998, 194-199.

Information scent:
[6] Olston, C. and Chi, E. ScentTrails: Integrating Browsing and Searching on the World Wide Web. *Submitted to SIGCHI 2001.*

Fish-eye views:
[7] Card, S. K., Mackinlay, J. D., and Shneiderman, B. *Information Visualization: Using Vision to Think.* Morgan-Kaufmann, San Francisco, 1998.

[8] Patent #5740285, Bloomberg, Dan S. and Davies, Daniel. Image reduction/enlargement technique.

Related concepts Check the Xerox Patent data base at http://comip.wrc.xerox.com/comip/icbuhome.nsf
What have you found in a data base search of the topic? Give patent or IP number of the most relevant items.
Patent #5526443, Nakayama, Takehiro. Method and apparatus for highlighting and categorizing documents using coded word tokens.
Patent #5384863, Huttenlocher, Daniel P. et al. Methods and apparatus for automatic modification of semantically significant portions of a document without document image decoding.
Patent #5060135, Levine et. al. Apparatus for manipulating documents in a data processing system utilizing reduced images of sheets of information which are movable.

Prototype Has a model, a prototype, or experiment of the invention been built, made, run or tested ?   ☒ Yes ☐ No

Yes. A prototype has been written in Java, using a component web browser (ICE Browser 5).

Xerox product Is the invention used by Xerox or is there a definite plan for use in a future product(s) ?   ☐ Yes ☒ No
If so, please identify the program(s) or product(s), and introduction dates:
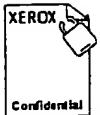
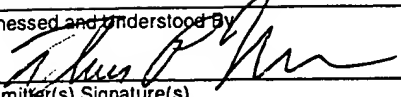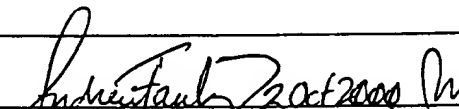| Witnessed and Understood By	Date
	10/3/00
Submitter(s) Signature(s)	Date
(signatures) 7/29/2000 ... 22 Oct 2000	10/3/00

Protect Until: Forever

No.

Disclosures Has this concept been disclosed to vendors, consultants, outside parties, partners, etc? Indicate the date(s) of any previous or planned future disclosure external to Xerox, and identify the type of disclosure (by agreement, demonstration, paper or presentation given, market probe, published article, etc., and if convenient, please provide a copy of the agreement, paper or article):

The attached paper indicates what was disclosed in the CHI submission, and this is highly similar to what was recently disclosed by PARC summer intern Andrew Faulring during a meeting of his research group at CMU.

Outside funding ☒ YES (Indicate Source of outside funding) ☐ NO

Yes. Partial funding for portions of the project were received by Office of Naval Research Contract No. N00014-96-C-0097.

Witnessed and Understood By	Date 10/3/00
Submitter(s) Signature(s)	Date
Allison Woodruff 9/29/2000 *Andrew Faulring* 2 Oct 2000 *[signature]* 10/3/00	10/3/00

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XEROX

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(Touch the hi-lighted areas to receive a definition of the category.)

Architecture and Document Services	
1.1	Advanced Print Services
1.2	Document Access & Management
1.3	Document Capture & Analysis
1.4	Document Systems Architecture
1.5	Electronic Document Commerce
1.6	Networked Document Systems
1.7	Productivity Initiatives
1.8	Process, Workflow, Information Management
1.9	Smart Design & Service
1.10	Work Process Analysis

Digital Imaging	
2.1	Capture
2.2	Presentation
2.3	Manipulation
2.4	Representation
2.5	Systems

Marking & Devices	
3.1	Latent Image Formation (Re-Imageable Process)
3.2	Development (Re-Imageable Process)
3.3	Image Transfer & Fixing (Re-Imageable Process)
3.4	Erase And Cleaning (Re-Imageable Process)
3.5	Fixed Image Marking (Incl. Direct To Plate)
3.6	Imager (ROS, Optics, Modulator, Illumination)
3.7	Thermal Ink Jet
3.8	Acoustic Ink Jet
3.9	Continuous Ink Jet
3.10	On Demand Powder
3.11	Other Direct Marking
3.12	Controls & Diagnostics (For Marking Systems)
3.13	Media Handling (Feeding, Transport, Finishing)
3.14	Marking System Integration & Architecture
3.15	Marking Hybrid Processes
3.16	Display Devices
3.17	MEMS Devices
3.18	Data Recording Devices
3.19	Digital Image Scanning

Materials & Materials Manufacturing	
4.1	Toner, Developer and Components (For Re-Imageable Process)
4.2	Photoreceptors and Components
4.3	Dielectric Receivers
4.4	Inks For Direct Marking
4.5	Powders For Direct Marking
4.6	Substrate Media (Paper, Transparencies, etc.)
4.7	Electronic Materials (Light Emitting Or Detecting, Semiconductors For Printhead Or Other Use)
4.8	Display Materials
4.9	Materials for Fusing
4.10	Drum And Belt Substrates
4.11	Materials for Binding and Finishing
4.12	Materials of Controlled Conductivity
4.13	Transfix Belt
4.14	Intermediate Transfer Belts
4.15	Magnetic Materials
4.16	Recording Media
4.17	Packaging Materials

Manufacturing Technology & Product Elements	
5.1	Component Development
5.2	Manufacturing Processes
5.3	Production Systems
5.4	Industrial Design / Human Factors
5.5	Device Electronics
5.6	Product Packaging

Speculative Research	
6.1	Document Futures
6.2	Applications outside Defined Xerox Direction

Protect Until: Forever

Manager's Comment Section

Submitter(s):	

Title of Invention	

Manager's Name	Date

1. Problem addressed or function provided by the invention:

Example 1A: Finisher cost reduction   *Example 1B: Uses low cost LCD to write annotation messages*

2. Central thrust of the invention:

Example 2A: Design incorporates fewer parts   *Example 2B: Uses low cost LCD to write annotation messages*

3. Could invention have impact beyond current description?

Example 3A: Could also function for printer finisher   *Example 3B: Could also function to erase/edit copy*

4. Potential for Xerox application. Specify product or technology program if possible:

Example 4A: Mainline approach in Program Q   *Example 4B: Adds significant feature to future products*

5. Value to competitors; potential for license or trade:

Example 5A: Enables much lower cost finishing than any known system   *Example 5B: Could be licensed in a business area un-related to Xerox*
and opens possibilities of moving finishing down-market

6. Please indicate any related patents, publications, or activities you know of:

7. I would recommend the following form(s) of protection: ☐ Patent   ☐ Defense publication   ☐ Keep trade secret   ☐ None

Comments: